The documentation and process conversion measures necessary to comply with this revision shall be completed by 6 November 1999

INCH-POUND

MIL-PRF-19500/383B
6 August 1999
SUPERSEDING
MIL-S-19500/383A
2 March 1993

PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICE, DIODE, SILICON, VOLTAGE-VARIABLE CAPACITOR
TYPES 1N5139A THROUGH 1N5148A
JAN, JANTX AND JANTXV

This specification is approved for use by all Departments
and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the performance requirements for a silicon, voltage-variable-capacitor diode. Three levels of product assurance are provided for each encapsulated device type as specified in MIL-PRF-19500.

1.2 Physical dimensions. See figure 1 (D0-7).

1.3 Maximum ratings.

Limit	P_T 1/	V_{RM} (wkg)	V_{BR} I_R = 10 µA dc	C V_R = 4 V dc f = 1 MHz	Capacitance Ratio	Q f = 50 MHz V_R = 4 V dc
	MW	V (pk)	V dc	pF		
Minimum	---	---	65	(See table II)	(See table II)	(See table II)
Maximum	400	60	---	(See table II)	---	---

1/ Derate linearly 2.67 mW/°C above 25°C.

OPERATING AMBIENT TEMPERATURE: -65°C TO +175°C.

STORAGE TEMPERATURE: -65°C TO +200°C.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Defense Supply Center Columbus, ATTN: DSCC-VAC, 3990 East Broad St., Columbus, OH 43216-5000, by using the addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 5961

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATION

DEPARTMENT OF DEFENSE

MIL-PRF-19500 - Semiconductor Devices, General Specification for.

STANDARD

MILITARY

MIL-STD-750 - Test Methods for Semiconductor Devices.

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Defense Automated Printing Service, Building 4D (DPM-DODSSP), 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for related associated specifications or specification sheets), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Associated specification. The individual item requirements shall be in accordance with MIL-PRF-19500, and as specified herein.

3.2 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein are defined in MIL-PRF-19500.

3.3 Interface requirements and physical dimensions. The Interface requirements and physical dimensions shall be as specified in MIL-PRF-19500 and figure 1 herein.

3.3.1 Lead finish. Lead finish shall be solderable in accordance with MIL-PRF-19500, MIL-STD-750 and herein. Where a choice of lead finish is desired, it shall be specified in the contract or purchase order (see 6.2).

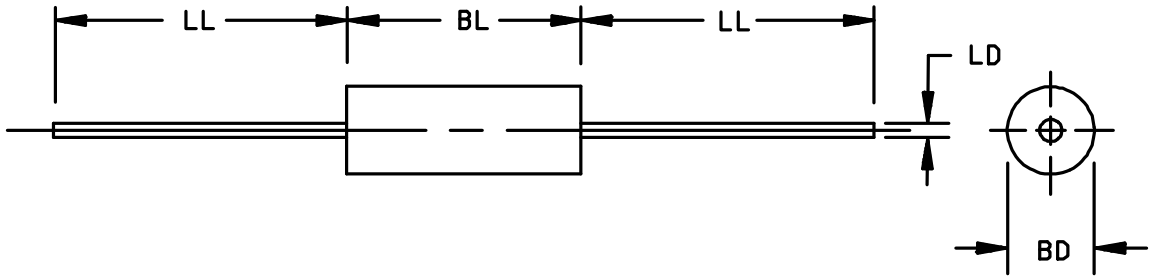
3.4 Marking. Marking shall be in accordance with MIL-PRF-19500.

3.4.1 Polarity. The polarity shall be indicated with a contrasting color band to denote the cathode end.

3.5 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in 1.3 and table I herein.

3.6 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table I herein.

3.7 Qualification. Devices furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified manufacturer's list before contract award (see 4.2 and 6.3).



Symbol	Dimension				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
BL	0.230	0.300	5.84	7.62	
BD	0.085	0.107	2.16	2.72	5
LL	1.00	1.500	25.40	38.10	
LD	0.018	0.022	0.46	0.56	3, 4

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. The specified lead diameter applies in the zone between 0.050 (1.27 mm) and 1.000 (25.40 mm) from the diode body. Outside of this zone the lead diameter is not controlled.
4. Both leads shall be within the specified dimensions.
5. The minimum body diameter shall be maintained over 0.15 (0.38 mm) inch of body length.

FIGURE 1. Physical dimensions (DO – 7).

4. VERIFICATION

4.1 Classification of Inspections. The inspection requirements specified herein are classified as follows:

a. Qualification inspection (see 4.2).

b. Screening (see 4.3)

c. Conformance inspection (see 4.4).

4.1.1 Sampling and inspection. Sampling and inspection shall be in accordance with MIL-PRF-19500, and as specified herein. Lot accumulation period shall be 6 months in lieu of 6 weeks.

4.2 Qualification inspection. Qualification inspection shall be in accordance with MIL-PRF-19500.

4.2.1 Qualification for a particular group of capacitances. Qualification for a particular group of capacitances requires the testing of the lowest- and highest-nominal-capacitance units in the group.

4.3 Screening. Screening shall be in accordance with table IV of MIL-PRF-19500, and as specified herein. The following measurements shall be made in accordance with table I herein. Devices that exceed the limits of table I herein shall not be acceptable.

Screen (see table IV of MIL-PRF-19500)	Measurements
	JANTX, JANTXV levels
2	T_A = +200°C, 48 hours
9	I_R
10	See 4.3.1
11	I_R; ΔI_R = 100 percent of initial value or 5 nA dc whichever is greater.
13	Subgroup 2 of table I herein;

4.3.1 Power burn-in conditions. Power burn-in conditions are as follows:

T_A = 175°C; V_R = 60 V dc, 96 hours.

4.4 Conformance inspection. Conformance inspection shall be in accordance with MIL-PRF-19500, and as specified herein.

4.4.1 Group A inspection. Group A inspection shall be conducted in accordance with MIL-PRF-19500, and table I herein.

4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified for subgroup testing in table VIb (JAN, JANTX, and JANTXV) of MIL-PRF-19500. Electrical measurements (end-points) shall be in accordance with table I, subgroup 2 herein.

4.4.2.1 Group B inspection, table VIb (JAN, JANTX and JANTXV) of MIL-PRF-19500.

Subgroup	Method	Condition
B2	1051	Test condition C, T (high) = +175°C.
B2	1056	Test condition A.
B3	1027	V_R = 60 V dc, T_A = 150°C, t = 500 hours.
B6	1032	T_A = 200°C, t = 500 hours.
B7		Temperature coefficient of capacitance. See 4.5.2 herein. T_A = -40°C to +85°C,max 0.03 % / °C. V_R = 4 V dc.

4.4.3 Group C inspection. Group C inspection shall be conducted in accordance with the conditions specified for subgroup testing in table VII of MIL-PRF-19500 and as follows. Electrical measurements (end-points) shall be in accordance with table I, subgroup 2 herein.

4.4.3.1 Group C inspection, table VII of MIL-PRF-19500.

Subgroup	Method	Condition
C2	2036	Test condition A, 4 pounds, t = 15.
C2	2036	Test condition E.
C3	2016	1500 G, 0.5 ms, 5 blows in each orientation: X_1, Y_1, and Y_2.
C3	2006	20,000 G, in each orientation: X_1, Y_1, and Y_2.
C6	1026	V_R = 60 V dc, T_A = 150°C

4.5 Method of inspection. Methods of inspection shall be as specified in the appropriate tables and as follows.

4.5.1 Pulse measurements. Conditions for pulse measurement shall be as specified in section 4 of MIL-STD-750.

4.5.2 Temperature coefficient of capacitance test. Throughout the temperature range specified, the capacitance shall not change by more than the amount specified relative to the capacitance value measured at T_A = 25°C. The temperature coefficient of capacitance may be computed by the following formula:

$$TC_C = \frac{CT(+85°C) - (-40°C)}{85 + 40} \times \frac{100}{CT(25°C)}$$

TABLE I. Group A inspection.

Inspection 1/	MIL-STD-750		Symbol	Limits 2/		Unit
	Method	Conditions		Min	Max	
Subgroup 1						
Visual and mechanical inspection	2071					
Subgroup 2						
Breakdown voltage	4021	I_R = 10 µA dc	B_V	65		V dc
Reverse current	4016	V_R = 55 V dc; dc method	I_R		20	nA dc
Capacitance 3/	4001	V_R = 4 V dc; f = 1 MHz	C	Column 3	Column 4	pF
Subgroup 3						
Reverse current	4016	V_R = 55 V dc; dc method; T_A = 150°C	I_R		20	µA dc
Subgroup 4						
Capacitance ratio operation	4001	From V_R = 4 V dc to V_R = 60 V dc; f = 1 MHz		Column 5		
Quality factor	4036	V_R = 4 V dc; f = 50 MHz	Q	Column 6		

1/ For sampling plans, see MIL-PRF-19500.
2/ Column references are to table II herein.
3/ End point only.

TABLE II. Test ratings.

Col 1	Col 2	Col 3	Col 4	Col 5	Col 6
Type (See 1.1)	Capacitance V_R = 4 V dc			Capacitance ratio From V_R = 4 V dc to V_R = 60 V dc	Q V_R = 4 V dc f = 50 MHz
	Nom	Min	Max	Min	Min
	pF	pF	pF		
1N5139A	6.8	6.46	7.14	2.7	350
1N5140A	10.0	9.50	10.50	2.8	300
1N5141A	12.0	11.40	12.60	2.8	300
1N5142A	15.0	14.30	15.70	2.8	250
1N5143A	18.0	17.10	18.90	2.8	250
1N5144A	22.0	20.90	23.10	3.2	200
1N5145A	27.0	25.70	28.30	3.2	200
1N5146A	33.0	31.40	34.60	3.2	200
1N5147A	39.0	37.10	40.90	3.2	200
1N5148A	47.0	44.70	49.30	3.2	200

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of material is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Points' packaging activity within the Military Department or Defense Agency, or within the Military Departments' System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Notes. The notes specified in MIL-PRF-19500 are applicable to this specification.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Issue of DODISS to be cited in the solicitation (see 2.1.1).

b. The lead finish as specified (see 3.3.1).

c. Type designation and quality assurance level.

d. Packaging requirements (see 5.1).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers List QML-19500 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from Defense Supply Center Columbus, DSCC-VQE, Columbus, OH 43216.

6.4 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

Custodians:
Navy - EC
Air Force – 11
DLA – CC

Review activities:
Navy – AS, CG, MC, SH
Air Force – 99

Preparing activity:
DLA – CC

(Project 5961-2167)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.

2. The submitter of this form must complete blocks 4, 5, 6, and 7.

3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-PRF-19500/383B	2. DOCUMENT DATE 990806

3. **DOCUMENT TITLE**
SEMICONDUCTOR DEVICE, DIODE, SILICON, VOLTAGE-VARIABLE CAPACITOR TYPES 1N5139A THROUGH 1N5148A JAN, JANTX AND JANTXV

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) COMMERCIAL DSN FAX EMAIL	7. DATE SUBMITTED

8. PREPARING ACTIVITY

a. Point of Contact Alan Barone	b. TELEPHONE Commercial DSN FAX EMAIL 614-692-0510 850-0510 614-692-6939 alan_barone@dscc.dla.mil
c. ADDRESS Defense Supply Center Columbus, ATTN: DSCC-VAC, 3990 East Broad Street, Columbus, OH 43216-5000	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Standardization Program Office (DLSC-LM) 8725 John J. Kingman, Suite 2533, Fort Belvoir, VA 22060-6221 Telephone (703) 767-6888 DSN 427-6888